

**U.S. FISH AND WILDLIFE SERVICE  
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Cordia rupicola*

COMMON NAME: (no common name)

LEAD REGION: 4

INFORMATION CURRENT AS OF: April 2010

**STATUS/ACTION:**

☐ Species assessment- determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date: ☐

☐ 12-month warranted but precluded - FR date: ☐

☐ Did the petition request a reclassification of a listed species?

**FOR PETITIONED CANDIDATE SPECIES:**

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a candidate (as currently defined): October 25, 1999

☐ Candidate removal: Former LPN: ☐

☐ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

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- \_\_\_ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- \_\_\_ F - Range is no longer a U.S. territory.
- \_\_\_ I - Insufficient information exists on biological vulnerability and threats to support listing.
- \_\_\_ M - Taxon mistakenly included in past notice of review.
- \_\_\_ N - Taxon may not meet the Act’s definition of “species.”
- \_\_\_ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY:

Flowering plant - Boraginaceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE:

Puerto Rico and Anegada (British Virgin Islands)

CURRENT STATES/TERRITORIES/COUNTRIES OF OCCURRENCE:

Puerto Rico and Anegada (British Virgin Islands)

LAND OWNERSHIP:

*Cordia rupicola* is currently known from three localities in Puerto Rico: Peñuelas, Guánica, and Vieques Island. The population in Peñuelas is located on privately owned land. The remaining two populations are located on protected lands, the Guánica Commonwealth Forest (managed by the Puerto Rico Department of Natural and Environmental Resources (DNER)) and the Vieques Island National Wildlife Refuge (managed by the Service).

On Anegada Island, *C. rupicola* is found on the western portion of the island, where it is located on both privately owned land and Crown-owned (British government) land, including a small portion within a designated Ramsar wetland site.

LEAD REGION CONTACT: Rob Tawes, 404/679-7142, robert\_tawes@fws.gov

LEAD FIELD OFFICE CONTACT: Marelisa Rivera, Caribbean Field Office, 787/851-7297, extension 231

BIOLOGICAL INFORMATION:

Species Description:

*Cordia rupicola* is a large shrub reaching up to 5 meters (m) (4.9 to 16.4 feet (ft)) in height. Leaves are ovate to elliptic, two to nine centimeters (cm) (0.8 to 3.5 inches (in)) long, and

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chartaceous (papery). The upper surface of the leaf is rigidly scabrous, puberulous underneath, and the strigose petioles are from 2 to 10 millimeters (mm) (0.1 to 0.4 in) long. Flowers are in solitary globular heads of 20, and about 1 cm (0.4 in) in diameter. The corolla is white, 7 mm (0.3 in) long, and the fruit is a one-seeded red drupe about 4-5 mm (0.2 in) long (Proctor 1991, p 65; Lioger 1995, p.313).

#### Taxonomy:

*Cordia* is a genus of about 250 or more species of trees and shrubs of tropical and subtropical regions. The genus has sometimes been placed in the segregate family Ehretiaceae under genus *Varronia* (*Varronia rupicola* (Urban) Britton) (Liogier and Martorell 1982, p. 149). *Cordia rupicola* is more commonly included in the Boraginaceae family, in the subfamily Cordioideae, distinguished by the terminal, twice-branched style and four stigmas (Liogier 1995, p. 313; Breckon and Kolterman 1996, p. 6). Liogier and Martorell (1982, p.149) recognized 17 species of *Cordia* from Puerto Rico. Fifteen species are considered to be native to Puerto Rico, and the remaining two are introduced. *C. rupicola* Urban and *C. rickseckeri* Millsp. are restricted to Puerto Rico and the Virgin Islands.

#### Habitat/Life History:

*Cordia rupicola* has been described from southwestern Puerto Rico, Vieques Island, and Anegada Island (British Virgin Islands). All four sites lay within the subtropical dry forest life zone overlying a limestone substrate (Ewel and Whitmore 1973, p. 72). Subtropical dry forest life zones receive a mean annual rainfall ranging from 61 to 102 cm (24 to 40 in). The vegetation in this life zone is deciduous on most soils, with tree species dropping leaves during the dry season. The vegetation usually consists of a nearly continuous single-layered canopy, with little ground cover. The leaves of dry forest species are succulent or coriaceous, and species with spines and thorns are common. Tree heights usually do not exceed 15 m (49 ft) and crowns are typically broad, spreading and flattened (Ewel and Whitmore 1973, p. 72).

In Puerto Rico, the species has been found in forested hills with low dense brush of 2 to 3 m (6.5 to 9.8 ft) in height; in open to relatively-dense shrublands; in low forest with canopy from 3 to 5 m high (8 to 15 ft); in open areas and along trails or roads; and at the edge of a dense low coastal shrubland/forest. Other tree species frequently found in *C. rupicola* localities include *Bourreria succulenta* var. *succulenta*, *Bucida buceras*, and *Bursera simaruba*. The shrub layer is dominated by *Croton humilis*, *Eupatorium sinuatum*, *Lantana reticulata*, and *Turnera diffusa*. The populations of *C. rupicola* in Puerto Rico are also found in close proximity to populations of the endangered plants *Eugenia woodburyana* Alain and *Trichilia triacantha* Urban, and other rare plants such as *Myrtus bellonis*, *Passiflora bilobata*, and *Nashia inaguensis* (Breckon and Kolterman 1996, p. 4, Monsegur and Breckon 2007, p. 1).

In Anegada, the species was located in open limestone pavement, limestone cays, and sand dunes. In a recent study, *C. rupicola*, was found in higher abundance (based on percentage occurrence across plots) on limestone but also widespread within the sand dunes (Clubbe *et al.* 2004, p. 344).

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Studies on the distribution, abundance, and reproductive biology of *C. rupicola* were conducted by scientists at the University of Puerto Rico, Mayagüez Campus (Breckon and Kolterman 1996, p. 6; Monsegur and Breckon 2007, p. 13). These authors reported the species flowering and fruiting in December to January (Breckon and Kolterman 1996, p. 4) and in June and July (Monsegur and Breckon 2007, p. 1). In March to April, all plants were observed sterile. Monsegur and Breckon (2007, p. 2) reported numerous seedlings (+140) and various saplings in Guánica. However, Monsegur and Breckon (2007, p. 7) reported no seedlings in Vieques Island.

#### Historical Range/Distribution

*Cordia rupicola* was first discovered by the German botanical collector Paul Sintenis in July, 1886, in the Los Indios Ward, located between Barinas and Guayanilla, Puerto Rico. It was later found in Guánica, Puerto Rico, in 1887, and again in 1943 and 1959 (Proctor 1991, p. 66). The species was thought to be endemic to Puerto Rico, but was collected by Proctor in May 1987, at the west end of the island of Anegada, British Virgin Islands (Proctor 1991, p. 66). Proctor (1994, p. 54) reported a specimen from Punta Jálova, Vieques Island, which had been previously recorded by Woodbury, possibly around 1978. Surveys conducted by Breckon and Kolterman in 1995 located the species at a site called El Peñón in Peñuelas (Breckon and Kolterman 1996, p. 6). In 2003, three individuals of *C. rupicola* were found adjacent to the Fuertes Trail within the Guánica Commonwealth Forest (Canals, DNER, pers. comm. 2004). In 2005, a specimen of *C. rupicola* was found on Lighthouse Peninsula in Vieques Island (Breckon and Kolterman 2005).

#### Current Range/Distribution

*Cordia rupicola* is currently known from three localities in Puerto Rico and several localities in Anegada Island (British Virgin Islands). Monsegur and Breckon (2007, p. 1) visited the historical localities in Puerto Rico and provided updated information about the status and distribution of the species. The distribution of the species in Guánica Commonwealth Forest has been expanded from one population to six populations. In Peñuelas, the authors found another individual in a ravine on the west side of El Peñón site (Monsegur and Breckon 2007, p. 6). On Anegada Island, *C. rupicola* is found in the North West section of the island and is reported as common (Clubbe *et al.*, 2004, p. 344; McGowan *et al.*, 2006, p. 5)

#### Population Estimates/Status:

In Puerto Rico, approximately 226 individuals of *C. rupicola* are known from three localities: Peñuelas, Guánica Commonwealth Forest, and Vieques National Wildlife Refuge (See table 1) (Monsegur and Breckon 2007, p. 1). The species is found also in the western half of the Anegada Island, where it is locally abundant on both limestone and sand dune systems (Clubbe *et al.*, 2004, p. 7, McGowan *et al.*, 2006, p. 5). Clubbe *et al.* (2004, p. 344) estimated the total population size for the species on Anegada Island to be several thousand individuals. Since that time, no additional information has become available.

**Table 1. Population Estimate of *Cordia rupicola* per Locality in Puerto Rico:**

Localities	Adult reproductive	Saplings	Seedlings	Total of plants
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El Peñón	16	0	0	16
Guánica Commonwealth Forest	34	30	142	206
Vieques Island	1	3	0	4
<b>Total</b>	<b>51</b>	<b>33</b>	<b>142</b>	<b>226</b>

#### THREATS:

- A. The present or threatened destruction, modification, or curtailment of its habitat or range. The species rarity and restricted distribution makes it vulnerable to habitat destruction and modification. At present time, approximately 226 individuals of *C. rupicola* are currently known in Puerto Rico. Sixty-eight percent of the known reproductive adults are located within the Guánica Commonwealth Forest and Vieques Island National Wildlife Refuge. The population of the Guánica Commonwealth Forest consists of isolated clusters of adult individuals with all the seedlings located below the parent shrub and no evidence of natural dispersion. This pattern does not represent a self-sustainable or healthy population. The remaining thirty-two percent of reproductive adults are found on privately owned land in Peñuelas within an area subject to urban development.

*Cordia rupicola* is a rare species that is difficult to identify and may be mistaken with the cucubano (*Guettarda scabra*), a common and widespread species in the Caribbean. Because identification of this species is difficult, it is threatened by management and maintenance activities. In both the Guánica Commonwealth Forest and the Vieques Island National Wildlife Refuge, this species is found at the edge of trails and roads making it more prone to be affected by management activities such as widening of trails and road repairs. Additionally, several individuals of *C. rupicola* are found underneath high power lines of the Puerto Rico Energy and Power Authority (PREPA) in the Guánica Commonwealth Forest, where they are threatened by maintenance activities such as cutting, burning, or the use of herbicides. The PREPA has a right of way to the power lines to ensure service in case of an emergency; this makes these individuals prone to be affected by maintenance of trails and power lines during an emergency such as a hurricane or storm. Coordination between PREPA and DNER has not always been sufficient to preclude damages to the species. Damage to individual plants caused by maintenance activities conducted by PREPA has been observed in Guánica (Omar Monsegur, personal observation 2009; Carlos Pacheco, personal observation 2009).

In Peñuelas, the species is found in an area that is currently under urban development pressure. The main population of the species in this area is located at El Peñón de Ponce, which is part of a residential development called “Urbanización El Peñón”. This project is currently under construction, and a proposal to expand this residential project has been submitted to the Service. On this site, the plants are located within residential lots, and although the lots are large in size, current and ongoing construction in many of the surrounding lots (some of which have been completely cleared for house construction), threaten to affect this population of *C. rupicola*. In addition, Monsegur and Breckon (2007, p. 6) reported that one individual was extirpated by the improvement of the Puerto Rico Highway Num. 2. According to the author, the vegetation was removed and the

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area was bulldozed, apparently to control run-off from the ravine. Furthermore, future projects are proposed for the surrounding areas which may cause this population to become more isolated and possibly eliminate the currently known individuals.

*C. rupicola* is also found in the western half of Anegada Island, but the population appears to be in good standing. However, despite efforts to maintain biodiversity and promote conservation in Anegada, *C. rupicola*, along with other rare plant species and its preferred limestone habitat, face threats of future habitat fragmentation, habitat modification, and invasive species (Pollard and Clubbe 2003, p. 5; McGowan *et al.*, 2006, p. 4). Anegada is under heavy pressure for residential and tourism development, which results in habitat loss, and upgrading and construction of new roads, which increases habitat fragmentation.

Based on the above discussion, the present or threatened destruction, modification, or curtailment of the species habitat or range is a current threat to the species.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

*Cordia rupicola* seeds can be found and purchased on the internet; however, there is no documentation that this species is being over utilized for this purpose.

C. Disease or predation.

There is no documentation that this species is threatened by disease or predation.

D. The inadequacy of existing regulatory mechanisms.

In 1999, the Commonwealth of Puerto Rico approved the Law # 241 known as the “Nueva Ley de Vida Silvestre de Puerto Rico” (New Wildlife Law of Puerto Rico). The purpose of this law is to protect, conserve and enhance both native and migratory wildlife species; declare all wildlife species within its jurisdiction the property of Puerto Rico, regulate permits, regulate hunting activities, and regulate exotic species among others. This law also protects plants. The Guánica Commonwealth Forest is designated as a Critical Wildlife Area (CWA) by the Commonwealth of Puerto Rico. The CWA designation constitutes a special recognition by the Commonwealth with the purpose of providing information to Commonwealth and federal agencies about the conservation needs of these areas and assisting permitting agencies in precluding negative impacts as a result of permit approvals or endorsements (DNER 2005, p.vii). The Guánica Commonwealth forest is also protected by Law #133 (“Ley de Bosques de Puerto Rico” or The Puerto Rico Forest Law), as amended in 2000, which prohibits damage and collection of flora and fauna at the public forest.

This species is considered a critical element by the DNER Natural Heritage Program. Although this designation does not provide regulatory protection, actions that may affect such species are generally scrutinized and measures to minimize or avoid impacts to these species are recommended and implemented. Management plans for Commonwealth forests include the protection and conservation of species classified under DNER regulations as critical, threatened, or endangered; however, the location of the individuals in the Guánica Forest makes the enforcement of these regulations

difficult. The species is located adjacent to existing trails and below existing power lines, and is not easily identifiable. In several occasions, coordination between the forest personnel and field staff from PREPA has not been effective at precluding damage to individuals during maintenance activities and power line replacement, particularly after an emergency response.

Although there are various conservation and education efforts taking place on Anegada Island to help protect this species and other rare plant and animal species on the island, the Service is unaware of any formal regulation specifically protecting this species. On November 3, 1999, a portion of western Anegada (1,071 hectares (2646 acres)) was designated as a Ramsar site and added to the List of Wetlands of International Importance (Western Salt Ponds of Anegada). A portion of the preferred limestone habitat of *C. rupicola* lies within this site which is owned by the British government. Although this designation does not necessarily instill a protected area legal status, the purpose of this list is to ensure the maintenance of the ecological character of each of the Ramsar sites by means of a wise use approach.

Based on the above discussion, the Commonwealth of Puerto Rico have adequate laws and regulations to protect critical element species within public forests; however, the implementation and enforcement of effective measures to protect individuals of *C. rupicola* located adjacent to existing trails and below power lines have not been effective. Thus, we consider this factor a current threat to the species.

E. Other natural or manmade factors affecting its continued existence.

Although invasive plant species are not a current problem, they may become so in the future. The only town in Anegada, The Settlement, has many invasive plants, three of which have been observed moving towards natural habitats (McGowan *et al.*, 2006, p. 4). Conservation measures need to be implemented before these threats have a lasting impact on the island.

The populations in Puerto Rico and Anegada Island may be vulnerable to hurricanes and human-induced fires. Every year, tropical storms and hurricanes are expected to occur during the August-October timeframe over the tropical Atlantic Ocean. Due to the reduced number and small size of the populations in Puerto Rico the species is prone to be severely affected or extirpated by a catastrophic hurricane. A catastrophic hurricane may result in extensive defoliation and would cause stem damage to the species. In Puerto Rico, *C. rupicola* occurs in the driest life zone on the island; fires, both natural and human-caused, are a frequent occurrence. Canals reported a minimum of six intentional fires per year within the Guánica Commonwealth Forest (Canals, pers. comm. 2008). Although DNER implements a fire prevention plan during the dry season, the plan focuses on areas adjacent to the forest roads and boundaries. The currently known individuals in the Guánica Commonwealth Forest are located in areas where prescribed burning is not frequently conducted. Moreover fires have been reported below the PREPA power lines, representing a severe threat to the currently known populations of *C. rupicola* in the forest. The Anegada Island also harbors xeric vegetation and may be threatened by human-induced fires. Fires are not expected to occur under natural

conditions in any ecosystem of Puerto Rico and the Virgin Islands, therefore the species is not adapted to such phenomena. Damage to the ecosystem and to the populations due to fire may be irreversible.

Based on the above discussion, we believe that the species is currently threatened by this listing factor.

#### CONSERVATION MEASURES PLANNED OR IMPLEMENTED:

The Service plans to notify personnel of DNER the findings of this review in 2011, and coordinate a meeting to discuss threats identified within the forest and possible measures to avoid or minimize these threats.

#### SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate):

Approximately 226 individuals of *C. rupicola* are currently known to occur in three localities in Puerto Rico. Approximately 16 of those individuals, known from Peñuelas, may be threatened by current expansion of an existing residential project. An additional population is found on the island of Anegada. There is pressure from residential and tourist development on Anegada Island. The Commonwealth of Puerto Rico has adequate laws and regulations to protect critical element species within public forests; however, due to the difficulty in identifying this species, the implementation and enforcement of effective measures to protect individuals of *C. rupicola* located adjacent to existing trails and below power lines have not been effective. The limited distribution and low number of individuals make this species vulnerable to catastrophic events such as hurricanes and human-induced fires. These threats support the biological vulnerability to maintain *C. rupicola* as a candidate species. Because of its limited distribution and degree of threats, we find that *C. rupicola* is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

#### RECOMMENDED CONSERVATION MEASURES:

Efforts should be taken by the Service to develop a conservation agreement with the private landowner of the Peñuelas site, to ensure protection of the species within the property. Also, a management plan between DNER and PREPA should be prepared and implemented to protect any individuals located near roads and trails edges, and within the high power line easement.

Sexual and asexual propagation experiments should be conducted to identify appropriate methods to propagate the species. Once propagation methods are developed, efforts should be



taken to establish a propagation program to augment existing populations and establish new self-sustaining populations in protected areas.

Conservation measures on Anegada Island need to be implemented before these threats have a lasting impact on the island and to the population.

#### LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
<b>High</b>	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	<b>Non-imminent</b>	Monotypic genus	4
		<b>Species</b>	<b>5*</b>
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

#### *Magnitude:*

*Cordia rupicola* has a restricted distribution in the subtropical dry forest of southwestern Puerto Rico and Vieques Island. Approximately 226 individuals of *C. rupicola* are currently known to occur in three localities in Puerto Rico. Approximately 68 percent of the currently known reproductive adults are located in the Guánica Commonwealth Forest where, due to the difficulty in identifying this species, it is threatened by management and maintenance activities; another 32 percent of the currently known reproductive adults are located on privately-owned property currently threatened by habitat destruction or modification. This species is also threatened by residential and commercial development on Anegada Island. Both populations, in Puerto Rico and Anegada, are also vulnerable to natural (*e.g.*, hurricanes) or manmade (*e.g.*, human-induced fires) threats. For these reasons, we believe that the magnitude of the current threats should be considered high.

#### *Imminence:*

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Two of the three known populations of *C. rupicola* in Puerto Rico are located on lands managed for conservation by the DNER or the Service. However these protected populations have a risk of being affected by human-induced fires and maintenance activities by the PREPA. The remaining population is currently threatened by the expansion of an existing residential project as well as by human-induced fires.

The population of *C. rupicola* on Anegada Island is currently in good standing. The threats this population faces are ones that will arise in the future, if conservation measures are not implemented and long-term impacts are not averted. For these reasons, we consider threats to the species as a whole as non-imminent.

Rationale for Change in Listing Priority Number (insert if appropriate): N/A

Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes

Is Emergency Listing warranted?

No. Although only three localities of *C. rupicola* are known in Puerto Rico, other suitable areas within and around protected areas such as Guánica Commonwealth Forest and Vieques National Wildlife Refuge, have not been surveyed extensively and may contain additional individuals of this species (Canals and Breckon, pers. comm. 2004; Canals pers. comm. 2008). Additional private lands adjacent to the currently known population site at El Peñón have not been surveyed and contain suitable habitat that may also harbor *C. rupicola*.

The population found on the British Virgin Island of Anegada is considered stable.

#### DESCRIPTION OF MONITORING:

Monsegur and Breckon (2007) conducted a survey of *C. rupicola* in Puerto Rico and found 210 additional individuals.

COORDINATION WITH STATES: (indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment):

*Cordia rupicola* is considered a critical species by the DNER, however, it was not included in the State Wildlife Action Plan. DNER and Guánica Commonwealth Forest provided the Service with information on the status of individuals of *C. rupicola* found within the Guánica Forest. The DNER protect and have management plans for federally listed species within the Guánica Forest.

Indicate which State(s) did not provide any information or comments: N/A

#### LITERATURE CITED:

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- Monsegur, O. and G.J. Breckon. 2007. Report on new population of *Cordia rupicola*. Project proposal under Grant Agreement No. 401816-G-015 between the U.S. Fish and Wildlife Service and University of Puerto Rico, Mayagüez Campus. 13 pp.
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- Pacheco, C. 2009. Personal observation, U.S. Fish and Wildlife Service, Caribbean Field Office, Boquerón, Puerto Rico.
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- Proctor, G. 1994. Vieques Mangrove Forest Manual. Department of Natural and Environmental Resources. San Juan, Puerto Rico. 72pp.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

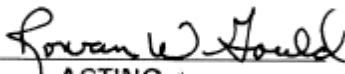


\_\_\_\_\_  
for Regional Director, Fish and Wildlife Service

June 14, 2010

\_\_\_\_\_  
Date

Concur:

  
\_\_\_\_\_  
ACTING  
Director, Fish and Wildlife Service

Date: October 22, 2010

Do Not Concur:

\_\_\_\_\_  
Director, Fish and Wildlife Service

\_\_\_\_\_  
Date

Director's Remarks:

Date of annual review:        March 2010

Conducted by: Caribbean Field Office, Boquerón, Puerto Rico